

path extends; electrically operated valves which subdivide the cooling medium paths; an electrically driven pump which provides cooling medium flows; an electronic control device which controls said valves and said pump depending on operational and environmental parameters, so that in a first operational phase of the internal combustion engine at low temperatures of the internal combustion engine a cooling medium supply by thermal siphon action with the pump stopped is prevented by closing of one of said valves and closing of the other of said valves.

REMARKS

This Amendment is submitted supplementary to the previous Amendment and in connection with the interview with the Examiner.

During the conference the Examiner indicated that it would be advisable to explain the interrelationship of the corresponding cooling medium paths disclosed in the present application and defined in the claims. It is respectfully submitted that a cooling circuit in the present application is a typical cooling circuit of an internal combustion engine of a motor vehicle, as clearly shown in Figure 1. The detailed description of the cooling circuit architecture is disclosed in the specification starting from page 13. Moreover, the claims specifically define that the cooling medium flows are

subdivided and determined by the cooling medium paths by means of the electrically operated valves, since an electronic control unit controls both the valves and the pump in dependence on operational and environmental parameters, as well as nominal values.

It is therefore believed that both in the description and in the corresponding claims it is explicitly stated how the cooling medium paths are arranged relative to one another and how they interact with one another. For example, in claim 1 it is stated that a first cooling medium path is provided through a bypass conduit, a second cooling medium path is provided through a main cooler of the internal combustion engine, a third cooling medium path is provided through a heating heat exchanger. These cooling medium paths are well known in the art.

The Examiner further indicated that it was important to clearly define in the claims the thermal siphon action and how it operates. As explained in previous correspondence, the thermal siphon action represents the supply of a fluid, here the cooling medium of the internal combustion engine, which is performed under the action of the gravity force acting on the cooling medium. In this manner when the cooling medium pump is turned on, a cooling medium flow takes place which in some cases counteracts the fast heating of the internal combustion engine in the starting phase. The

method disclosed in the present application as well as the cooling and heating circuit make possible in an advantageous manner to suppress this thermal siphon action and to provide an improved heating of the internal combustion engine, in particular in its starting phase.

As for the Examiner's question when the valves are closed, it is believed that it is clear for a person skilled in the art. With the closed valves the cooling fluid is enclosed between the valves, and a volume increase is thereby not possible. The pressure of the fluid increases due to the obtained heating and determines also the time point, at which the valves must be again open. When the valves are closed, a flow of the cooling fluid between the valves is not possible, so that a flow due to the thermal siphon action does not occur.

The cooling medium path through the internal combustion engine is closed. For this purpose at the input side and at the output side of the internal combustion engine, valves in the corresponding cooling medium conduits are closed. In other words, the cooling medium flow through the motor is interrupted. In the motor however the immovable cooling medium enclosed between the two valves is located. In this way a heat transport from the motor is prevented.

Claims 7 and 8 have been amended to reflect this explanation, while it is believed that it is not completely necessary. In other words, the valves are closed to suppress the supply of the cooling medium by the thermal siphon action into the motor. The valves in the motor inlet conduit and in the motor outlet conduit are closed. This is clearly shown in Figure 1 and described in the specification. This also clearly distinguishes the present invention from the prior art applied by the Examiner, in particular from the patent to Corriveau.

As for the part of the description in the patent to Corriveau mentioned by the Examiner, in particular column 5, lines 5-7, it is mentioned there the heating valve 32 is closed to increase the system pressure and thereby to increase the cooling medium volume flow through the cooler 16. However, the feature that the valves are closed to stop the cooling medium volume flow through the internal combustion engine is not disclosed in this reference. The arguments emphasizing further distinctions of the present invention from this reference were presented in the previous Amendments.

The claims have been also amended to define that the valves 34 and 36 are closed to suppress the cooling medium flow by the thermal siphon action, in the cooling medium inlet conduit to the internal combustion engine and in the cooling medium outlet conduit from the internal combustion

engine. It should be mentioned that in some cases a direction reverse of the cooling medium flow is possible, so that a valve such as for example the valve 34 which under certain operational conditions (operational type of the fluid pump) is arranged in the cooling medium inlet conduit of the internal combustion engine, during the reverse of the flow direction is located in the cooling medium outlet of the internal combustion engine.

It is therefore respectfully submitted that claims 7, 8 and 13 should also be considered as patentably distinguishing over the art and should also be allowed.

Reconsideration and allowance of the present application is most respectfully requested.

Should the Examiner require or consider it advisable that the specification, claims and/or drawings be further amended or corrected in formal respects in order to place this case in condition for final allowance, then it is respectfully requested that such amendments or corrections be carried out by Examiner's Amendment, and the case be passed to issue. Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, he is invited to telephone the undersigned (at 631-549-4700).

Respectfully submitted,



Michael J. Striker  
Attorney for Applicants  
Reg. No. 27233